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FIRST ANNUAL MEETING OF THE OHIO SECTION.

The Ohio Section of the Mathematical Association of America was organized at Columbus, December 30–31, 1915, in connection with the meetings for the founding of the national Association. Twenty-five Ohio teachers of collegiate mathematics were registered in the organization meetings. A constitution was adopted and the following officers elected: Professor R. B. ALLEN, Kenyon College, Chairman; Professor G. N. ARMSTRONG, Ohio Wesleyan University, Secretary-Treasurer; and Professor C. C. MORRIS, Ohio State University, third member of the Executive Committee. The Section applied to the national Association for a charter, which was granted March 1, 1916.

The first annual meeting of the Section was held at the Ohio State University, Columbus, on April 21–22, 1916, in connection with the meetings of The Ohio College Association, The Ohio Academy of Science, The Ohio Society of College Teachers of Education, and The Association of Ohio Teachers of Mathematics and Science.

The following forty persons were in attendance, of whom all but the last six had already joined the Association:

R. B. Allen, Kenyon College; F. Anderegg, Oberlin College; W. E. Anderson, Wittenberg College; G. N. Armstrong, Ohio Wesleyan University; C. L. Arnold, Ohio State University; C. B. Austin, Ohio Wesleyan University; Miss Grace M. Bareis, Ohio State University; J. B. Brandeberry, Toledo University; Miss Elizabeth Burnell, Lake Erie College; A. G. Caris, Defiance College; George E. Carscallen, Hiram College; Oscar Dustheimer, Baldwin-Wallace College; J. B. Faught, Kent State Normal College; T. M. Focke, Case School of Applied Science; Miss Harriet E. Glazier, The Western College; M. E. Graber, Heidelberg University; Harris Hancock, University of Cincinnati; E. J. Hirschler, Bluffton College; William Hoover, Ohio University; Christian Hornung, Heidelberg University; Charles A. Hutchinson, Wittenberg College; H. W. Kuhn, Ohio State University; Miss Gertrude McCain, Oxford College for Women; G. W. McCoard, Ohio State University; Charles N. Moore, University of Cincinnati; C. C. Morris, Ohio State University; A. D. Pitcher, Western Reserve University; S. E. Rasor, Ohio State University; Miss Hortense Rickard, Ohio State University; Karl D. Swartzel, Ohio State University; L. E. Urner, Miami University; C. J. West, Ohio State University; Forbes B. Wiley, Denison University; B. F. Yanney, College of Wooster; Miss Lily Batterham, Ohio State University; Miss Lucile Brown, Ohio State University; C. W. Keyser, Zanesville; Miss Hazel E. Schoonmaker, Denison University; T. Elmer Trott, Mount Union College; A. E. Young, Miami University.

The members of the Section dined together at the Ohio Union on Friday at six o'clock, and later in the evening attended an address by Professor Charles H. Judd, of the University of Chicago, on "The more complete articulation of higher institutions with the high school."

On Saturday morning a symposium was conducted by all the associations and the Section was represented by Professor A. D. Pitcher, of Western Reserve University, who spoke on "Mathematics and the college curriculum." Following this a joint session was held with the Association of Ohio Teachers of Mathematics and Science.

At the business sessions the following motions were passed: (1) That one meeting should be held each year in the spring in conjunction with the Ohio College Association; (2) that a collection of twenty-five cents each be taken to meet the expenses of this meeting for printing and postage; (3) that the national Association be asked to appropriate five per cent. of the annual dues and at least one half of the initiation fees of new members in each section for financing the sections and stimulating them to retain and to gain members for the Association. The officers elected for the following year are: Professor T. M. Focke, Case School of Applied Science, President; Professor G. N. Armstrong, Ohio Wesleyan University, Secretary-Treasurer; Professor C. C. Morris, Ohio State University, member of Executive Committee.

The following formal papers were presented:

(1) "What elective courses following the calculus should the average college offer?" Professor A. E. Young, Miami University. (Introduced by the Chairman of the Section.)

The discussion was led by Professors C. C. Morris, S. E. Rasor, and M. E. Graber.

(2) The Chairman's address on "Hypercomplex number systems." Professor R. B. Allen, Kenyon College.

(3) "Divergent series and their applications." Professor C. N. Moore, University of Cincinnati.

(4) "The bearing of recent legislation on the teaching of mathematics." Professor B. F. Yanney, College of Wooster.

(5) "What courses should be offered for prospective teachers of secondary mathematics?" Professor Harriet Glazier, Western College for Women.

(6) "Minimum requirements for unqualified endorsement for a teacher of high-school mathematics." Professor J. B. Faught, Kent State Normal College.

The following brief notes were presented:

(7) "A device for the trisection of an angle." Professor Christian Hornung, Heidelberg University.

(8) "The degree of convergence of a Fourier series of a limited number of terms." Professor T. M. Focke, Case School of Applied Science.

(9) "The evaluation of a certain volume integral." Professor F. Anderegg, Oberlin College.

(10) "Some cases of the cubic equation." Professor William Hoover, Ohio University.

(11) "Descriptive geometry analyses for common geometry constructions." Professor G. N. Armstrong, Ohio Wesleyan University.

(12) "An interesting combination of figures." Professor F. B. Wiley, Denison University.

(Note: Owing to lack of time (11) and (12) were omitted.)

Following are abstracts of the papers presented.

(1) In considering the question as to what elective courses should follow the calculus in the ordinary college, Dr. A. E. Young suggested that all such courses could be classified as algebraic, geometric, functional, or applied mathematics. He favored courses taken from the first two classifications for the average student, a functional course for the exceptionally brilliant, and courses in applied mathematics for the prospective engineer.

In discussing this paper, Professor Morris called attention to the fact that the ordinary freshman course covers college algebra, trigonometry, and analytical geometry. These courses are so fundamental and are done in such a superficial manner that he advocates following the calculus with a thorough course in plane and solid analytical geometry in the junior year, followed in the senior year with a course in the theory of equations and the elements of the theory of numbers. A student with this preparation is prepared to proceed in any one of many directions.

In making up a twelve-hour program beyond the calculus, Professor Rasor would include a course in algebra, one in geometry, say plane and solid analytics; and then without question a course in differential equations, or advanced calculus inclusive of differential equations—something to give contact with the practical and usable.

In his discussion, Professor Graber noted that trigonometry and analytical geometry are generally presented by the text book and problem method, but in the calculus freer and more general methods of instruction may be introduced, leading up to the lecture plan. Most of our colleges offer at least one advanced course in each of the four divisions, analysis, mechanics, algebra, and geometry, without special attempt to correlate these subjects with one another or with science and engineering. There should be a well-defined connectivity in the post-calculus courses both with the different fields of mathematics and the applications of science. A spiral extension of elementary mathematics into the outlying fields of number theory, modern geometry, substitution groups, mechanics, and the fundamental notions of modern mathematics in general, affords abundant material for lectures in the courses following the calculus.

(2) Professor Allen gave a few of the fundamental theorems on hypercomplex number systems, with enough of the proofs to indicate their elementary character; and by use of these showed the only real number systems in which division is unambiguous to be the real system, the ordinary complex system, and the real quaternion system.

(3) In Professor Moore's paper, a brief account of the history of divergent series was given. Some of the principal methods of summation were described, and a few of their more important applications were indicated.

(4) Professor Yanney showed that it is possible, as the laws in Ohio are administered, for a college graduate to qualify for a provisional state certificate to teach in the high schools without any special scholastic training in any subject. This is at variance with what experience has shown to be the best preparation for efficient teaching in secondary schools. However, in spite of this deficiency in the laws, there is good evidence that the better colleges, pretending to prepare secondary teachers, demand fully two years in college mathematics including calculus, followed by special courses in the history and teaching of mathematics. The present situation offers the new Association an opportunity to use its influence in the direction of a better public sentiment in the matter of scholastic equipment of the secondary teacher of mathematics.

(5) Professor Glazier insisted that the college must consider the needs of the secondary teachers in mathematics. What they teach, and how they teach it, will determine largely the place of mathematics in the high school curriculum. In addition to the regular undergraduate courses in mathematics the college should also give: (1) A survey course dealing with the fundamental concepts of algebra and geometry, and relating the college mathematics to the secondary. (2) A pedagogical course for consideration of questions definitely concerned with the teaching of mathematics. (3) A history course which should give the historical background of the subject and familiarity with the mathematical literature and mathematical activities.

(6) According to Professor Faught, the minimum academic requirements for unqualified endorsement for a teacher of high-school mathematics should be (1) a four-year high school course with three years of mathematics and one year of physics. (2) A college course with two years of mathematics, including college algebra, trigonometry, analytical geometry, and calculus, and one year of physics. The professional requirements should be (1) one year of educational psychology, principles of teaching and history of education. (2) One year of special methods in algebra and geometry, with the history of mathematics. (3) One half year of observation and practice teaching of algebra and geometry.

(7) Professor Hornung described a piece of mechanism invented by one of his pupils, about eighteen years of age, whereby any angle may be trisected. It consists of a pencil, a string, and a right triangular prism of small height, so

connected that when the base of the prism is moved along the bisector of the angle, as directrix, the pencil will describe a curve, which, by a proper selection of starting point and focus, will pass through a trisection point of any circular arc subtending the angle whose center is at the vertex of the angle. The curve so drawn is an hyperbola.

(8) It can be shown, theoretically, that the r terms of a series of the usual Fourier form that will best represent all the points on a given curve between 0 and 2π, will be the first r terms of the infinite Fourier series. Professor Focke showed, by means of machine drawn curves, that it is possible to find curves whose equations are of the same form and number of terms, which will give a much better approximation to the given curve over a very considerable part of the interval.

(9) On encountering the problem of finding the volume of the solid bounded by the surface $(x^2/a^2 + y^2/b^2 + z^2/c^2)^2 = x^2/a^2 + y^2/b^2 - z^2/c^2$, it occurred to Professor Anderegg that the solution could be simplified by using an auxiliary solid whose surface is obtained from the given surface by putting $x/a = x'$, $y/b = y'$, $z/c = z'$, so that

$$V = \int\int\int dxdydz = abc \int\int\int dx'dy'dz' = abcV'.$$

The auxiliary surface $(x'^2 + y'^2 + z'^2)^2 = x'^2 + y'^2 - z'^2$ is obtained by revolving the lemniscate $(x^2 + z^2)^2 = x^2 - z^2$, or $\rho^2 = \cos 2\theta$ about the Z-axis, and the volume bounded by it is easily found. The solution of many problems in quadrature and cubature can be simplified by this device.

(10) The instances of cubic equations presented by Professor Hoover consisted mainly of a number of interesting cases of the cubic resulting from discussions in the applications of pure mathematics over a considerable range of subjects, giving concreteness to the instances adduced.

In his address before the general session on Saturday morning, Professor Pitcher called attention to the responsibility of a given college department to those students who can take but little work in the department but who would acquire as broad a knowledge of the subject as possible. The problem of discharging this responsibility is a very difficult one for mathematics on account of its technical character but very important on account of its many values, especially on account of its central position in scientific learning. Probably an improvement of current conditions may be secured by offering a modified first course to be taken by all alike. Such a course could contain a somewhat broader selection of material than at present and omit certain technique without interfering with the values usually attached to a first course. A further help would be an historical synoptic course open to juniors and seniors who by their first two years of college work have shown themselves capable of mature thought and serious work.

G. N. ARMSTRONG,
Secretary.